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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,877	11/07/2001	Ricardo J. Motta	1039.017	7967

22186 7590 03/13/2003

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EXAMINER
SANDERS, ALLYSON N

ART UNIT	PAPER NUMBER
2876	

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/045,877	MOTTA ET AL.	
	Examiner	Art Unit	
	Allyson N. Sanders	2876	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1, 3-8, 10-15, and 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Dunton (6,526,366).

Regarding claim 1, an imaging system comprising an image sensor, a memory, and a processor, wherein: the image sensor is configured to generate image signals corresponding to an image of a scene; the memory is configured to store image data corresponding to the image signals; and the processor is configured to control operations of the imaging system in a diagnostic mode and in a normal operating mode, wherein, during the diagnostic mode, the processor analyzes the image data to determine if the image sensor is defective is disclosed.

Dunton teaches the following in regards to claim 1:

"This invention pertains to an imaging sensor, and more particularly to an imaging sensor having defects." (Col. 1, lines 5-6).

"Complementary Metal Oxide Semiconductor (CMOS) sensors are an alternative to Charge Coupled Devices (CCDs) in imaging devices. Unlike a CCD, the individual picture elements (pixels) in the CMOS sensor are separately addressable. This gives CMOS sensors an advantage over CCDs: a defective pixel does not make the entire CMOS sensor unusable. Today, CMOS sensors are used in all manners of imaging devices: for example, digital still and video cameras, optical scanners, facsimile machines, and robotics, to name just a few." (Col. 1, lines 10-19).

"But detecting defects is an expensive process, employing special equipment and test patterns to identify defective pixels in the CMOS sensor. This testing is done after production of the CMOS sensor to determine if the defects make the CMOS sensor unusable." (Col. 1, lines 20-24).

"In FIG. 1, CMOS sensor embodiment 105 is installed in digital camera embodiment 130. A person skilled in the art will recognize that CMOS sensor embodiment 105 may be installed in other imaging devices, for example, digital video cameras, optical scanners, facsimile machines, and robotic devices (e.g., robots that rely on visual input to perform their tasks). Digital camera embodiment 130 includes testing mechanism 135 and storage device 140. Testing mechanism 135, in this camera embodiment, reads the defect markers from CMOS sensor embodiment 105 and identifies the defective pixels of CMOS

sensor embodiment 105 in a defect map stored in storage device 140." (Col. 2, lines 41-48).

"In this embodiment, storage device 140 comprises a programmable read-only memory (PROM), but a person skilled in the art will recognize that other storage devices can be used, such as non-volatile memory, for example. Further, volatile memory may also be used, although this may be more complex: i.e., accommodating due to the risk of loss of the stored information. Digital camera embodiment 130 may also include compensation unit 145, which in this embodiment compensates for the defective pixels stored in the defect map in storage device 140. For example, compensation unit 145 may identify pixels to be used in place of defective pixels." (Col. 2, lines 56-67).

3. Regarding claims 3 and 10, the invention of claims 1 and 8 respectively, wherein the diagnostic mode enables the imaging system to be tested using a testing system, wherein: the processor generates instructions for controlling test operations of the testing system; the testing system provides a set of light stimuli for the image sensor in response to the instructions; and the processor generates test results based on the image data indicating whether the image sensor is defective is disclosed.

Dunton teaches the following in regards to claims 3 and 10:

"Pixels 110 generally comprise photo diodes that change their electrical characteristics in response to illumination, referred to here as photodiodes and are arranged in an array on a die." (Col. 2, lines 1-4).

"Some pixels may be defective; other pixels may operate properly. In this context, a pixel is considered defective if its behavior significantly deviates from an expected response. For example, pixel 120-1 shows a pixel that is defective. Pixel 120-1 may have one of a number of defects as described herein; more detail can be found hereafter with reference to FIG. 2. In comparison, pixel 120-2 is illustrated as an operational pixel. Provided the number of defective pixels in CMOS sensor embodiment 105 is relatively low enough and generally not too close together, CMOS sensor embodiment 105 will pass testing." (Col. 2, lines 7-18).

"FIG. 4 is a flowchart of an embodiment of a method of testing a CMOS sensor according to the one embodiment. At block 402, the CMOS sensor is reset. At block 405, the pixels of the CMOS sensor are exposed to light. At block 410, the pixels, including the defective pixels, are interrogated for their values. By interrogating the defective pixels for their values, the imaging device can build a defect map of the CMOS sensor. In this embodiment, the defective pixels read as unexposed, even when exposed to light. Thus, after a sufficient exposure period, pixels still reading "black" are pixels marked as defective. At block 415, the imaging device creates a defect map. Finally, at block 420, the imaging device stores in its memory the defect map." (Col 3, lines 46-58).

4. Regarding claims 4, 11, and 19, the invention of claims 3, 10, 18 respectively, wherein the test results are stored in the imaging system for access by the processor during the normal operating mode is disclosed.

Dunton teaches the following in regards to claims 4, 11, and 19:

"FIG. 4 is a flowchart of an embodiment of a method of testing a CMOS sensor according to the one embodiment. At block 402, the CMOS sensor is reset. At block 405, the pixels of the CMOS sensor are exposed to light. At block 410, the pixels, including the defective pixels, are interrogated for their values. By interrogating the defective pixels for their values, the imaging device can build a defect map of the CMOS sensor. In this embodiment, the defective pixels read as unexposed, even when exposed to light. Thus, after a sufficient exposure period, pixels still reading "black" are pixels marked as defective. At block 415, the imaging device creates a defect map." (Col. 3, lines 46-58).

"Finally, at block 420, the imaging device stores in its memory the defect map." (Col. 3, lines 57-58).

5. Regarding claims 5 and 12, the invention of claims 3 and 10 respectively, wherein the test results identify a set of one or more defective pixels in the image sensor is disclosed.

Dunton teaches the following in regards to claims 5 and 12:

"An imaging sensor includes a defect marker allowing an imaging device in which the imaging sensor is installed to determine which pixels in the CMOS sensor are defective. During manufacturing, the pixels in the imaging sensor are tested. Defect markers are used for defective pixels, preferably using a non-volatile marking technique." (Abstract, lines 1-6).

6. Regarding claims 6 and 13, the invention of claims 3 and 10 respectively, wherein the imaging system is configured to use the test results during the normal operating mode to compensate for one or more defective pixels identified during the diagnostic mode is disclosed

Dunton teaches the following in regards to claims 6 and 13:

"Imaging device manufacturers then retest the CMOS sensor to determine which pixels are defective and "compensated."" (Col. 4, lines 53-54).

7. Regarding claims 7, 14, and 20, the invention of claims 3, 10, and 18 respectively, wherein the testing system is configured to test a packaged image sensor is disclosed.

See Dunton's teachings above regarding claim 1.

8. Regarding claim 8, a method for fabricating an imaging system comprising the steps of: fabricating an imaging system comprising the steps of: forming an image sensor configured to generate image signals corresponding to an image of a scene, forming a memory configured to store image data corresponding to the image signals; and forming a processor configured to control operations of the imaging system in a diagnostic mode and in a normal operating mode, wherein, during the diagnostic mode, the processor analyzes the image data to determine if the image sensor is defective is disclosed.

See Dunton's teachings in regards to claim 1.

9. Regarding claim 15, an imaging system comprising an image sensor, a memory, and a processor, wherein: the image sensor is configured to generate image signals corresponding to an image of a scene; the memory is configured to store image data corresponding to the image signals; and the processor is configured to control operations of the imaging system in a normal operating mode, wherein, during the normal operating mode, the processor processes the image data to compensate for one or more defective pixels in the image sensor is disclosed.

See Dunton's teachings in regards to claims 1 and 6.

10. Regarding claim 17, the invention of claim 15, wherein the processor is further configured to control operations of the imaging system in a diagnostic mode, wherein, during the diagnostic mode, the processor analyzes the image data to identify the one or more defective pixels in the image sensor is disclosed.

See Donton's teachings in regards to claims 3 and 5.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 2, 9, and 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Dunton (6,526,366) in view of Moberly (6,484,280).

Dunton's teachings are discussed above.

Dunton fails to teach the memory and the processor being implemented as a SOC.

Regarding claims 2, 9, and 16, the invention of claims 1, 8, and 15 respectively, wherein: the image sensor, the memory, and the processor are implemented as a system-on-a-chip (SOC) in a single integrated circuit; and the image sensor is a digital pixel sensor that generates digital image signals for storage in the memory is disclosed.

Moberly teaches the following in regards to claims 1, 8, and 15:

"FIG. 1 shows a typical system-on-a-chip (SOC) 100. This kind of complex integrated circuit typically contains processor 110, memory 120, and peripheral interfaces 130 and 140. Communications with the off-chip world is through peripheral lines 160, 170 and bus 150. These SOC integrated circuits are commonly synthesized using high level design tools from Verilog or VHDL sources." (Col. 2, lines 37-43).

In view of Moberly's teaching, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to use a SOC. As Moberly states, SOCs are common for complex integrated circuits. One would be motivated to use a SOC because they are space efficient and process quickly.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Merrill et al (6,525,304), Fowler et al (5,461,425), Kramer et al (6,504,572), Granfors et al (6,498,831), Shimura (6,307,393), Tan (6,381,357), and Tanaka (5,594,248).

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Allyson Sanders* whose telephone number is (703) 305-5779. The examiner can normally be reached between the hours of 7:30AM to 4:00PM Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Lee, can be reached on (703) 305-3503. The fax phone number for this Group is (703) 308-7722, (703) 308-7724, or (703) 308-7382.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to **[allyson.sanders@uspto.gov]**.

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the

Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Allyson Sanders
Patent Examiner
Art Unit 2876
February 27, 2003

David L. Lee
Primary Examiner
Art Unit 2876